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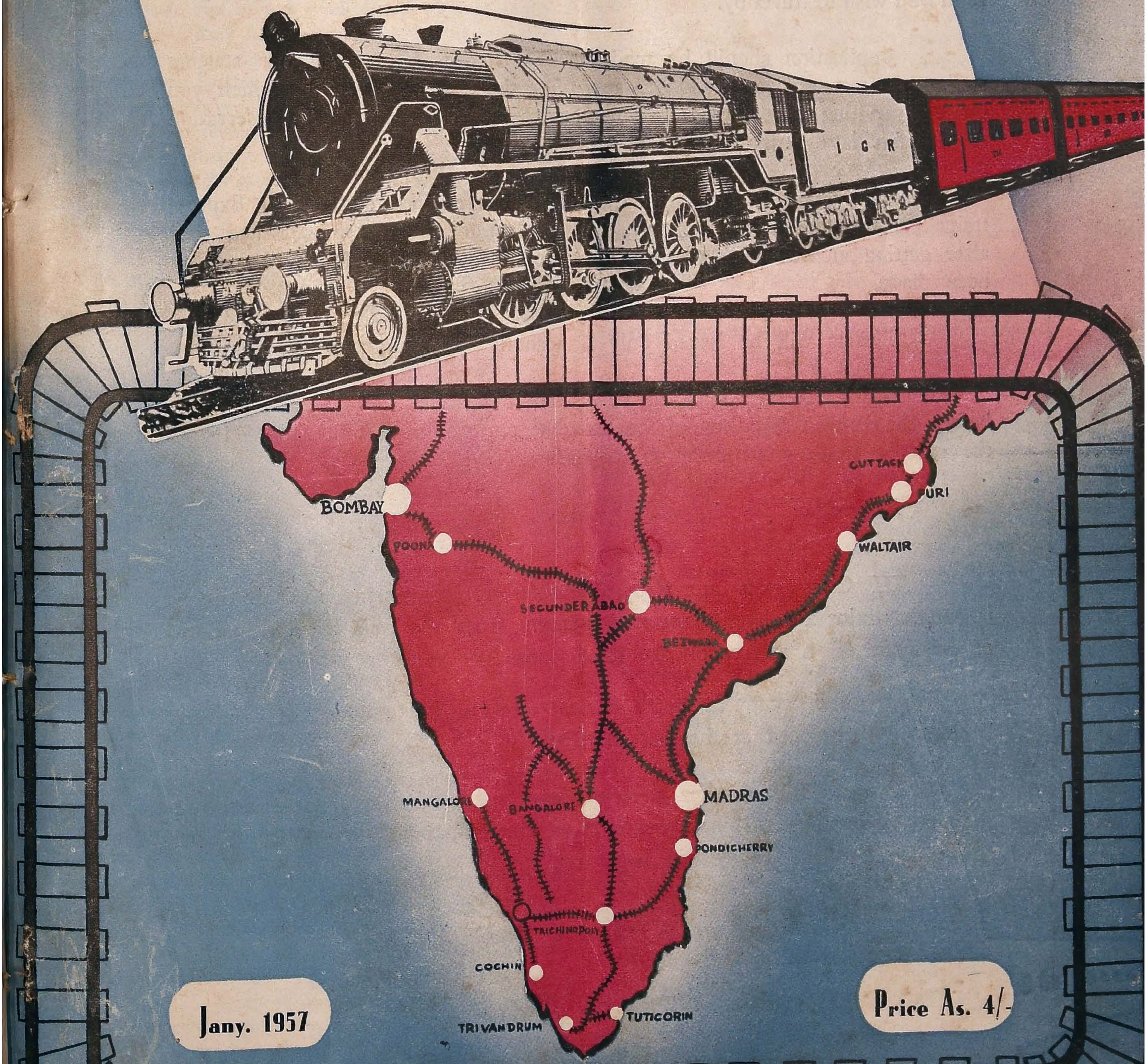
SOUTHERN RAILWAYS *Magazine*



Jany. 1957

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Unless you reserve your berth (I and II Class) or Seat (3rd Class long distance) in advance, you may not be sure of getting accommodation on the train you wish to travel by.

Application should be made to the Station Master of your starting station at least 3 days in advance specifying the date and train by which you intend travelling and the tickets must be bought in advance. The reservation fee leviable is 8 Annas per seat or berth.

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Tickets will be issued only if accommodation is available.

If the reserved seats or berths are not occupied at least 5 minutes before the booked departure of the train the reservation will be cancelled and the seat or berth given away to another.

Reservation fee is not refundable.

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(Inserted in the interests of Travelling Public)

Forge for Production of Railway Wheels

A new forge for producing rolled-steel solid wheels and disc centres for railway carriages and wagons has been brought into use at the Trafford Park Steel Works, Manchester, of Messrs. Taylor Brothers and Company, Limited. The plant includes a notable rotary-hearth furnace (believed to be the largest in Europe), an 8,500-ton forging press, two other large presses, and a rolling mill for forming the rims. The block from which a wheel or wheel centre is made heated in the furnace to forging temperature—the heating and soaking taking about 6¼ hours, equivalent to nearly one revolution of the rotary hearth—and is then passed through the presses and mill in about five minutes, without reheating, emerging as a completed forging ready for machining.

The whole plant is mechanised to an unusually high degree, mechanical handling equipment conveying the steel blocks between the furnace, presses and mill with a minimum of human control. The man-power

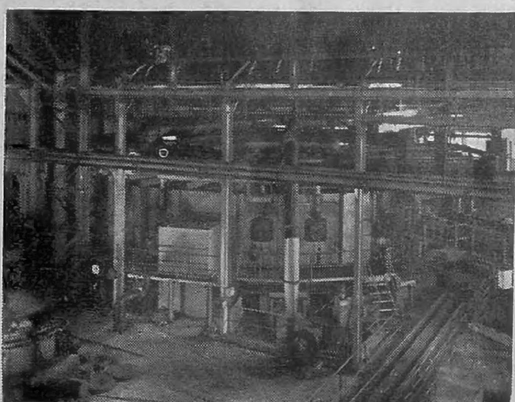


Fig. 1. Rotary-Hearth Furnace.

is only 50 per cent. of that in the old plant, which is to be used for tyre manufacture and produced an average of 40 wheels an hour. In the new plant 11 operators, including furnacemen, produce 60 wheels an hour. This output may be increased when the operation and maintenance of the forge have been perfected. With a plant which is so automatic in operation, a few months must elapse before its optimum performance is reached, but then it will undoubtedly justify the investment of over £ 1,000,000 which it represents. It has been financed by the English Steel Corporation—Messrs. Taylor Brothers being one of the E. S. C. group of companies—the money coming wholly from profits. Taylor Brothers, Limited, have been the largest producers of railway wheels in the British Empire for many years, and as the English Steel Corporation have recently also installed new plants in Sheffield for the more efficient production of railway springs and cast-steel bogies and automatic couplers, the new wheel forge is further evidence of the importance attached in the E. S. C. group of companies to the manufacture of railway materials, more than 50 per cent of the output being exported.

The new plant produces wheels ranging from 24 in. to 50 in. diameter on the tread, at a continuous rate of 60 pieces per hour. In conjunction with Mr. E. Homer Kendall, the American consulting engineer, the layout of the plant and the design of the equipment were completed by Taylor Brother's engineering department, under the control of Mr. J. H. Ellis, assistant chief engineer in charge of development. The major items of plant comprise the 69-ft. diameter rotary-hearth furnace, illustrated in Figs. 1, 2, 7 and 8 the 8,500-ton forging press, a 1,000-ton punching press, an electrically-driven rolling mill, a 2,000 ton dishing press, and fully-automatic handling plant designed to ensure fast production and an appreciable saving in labour. Separate 6,600-volt incoming supply cables and switch-gear have been installed and the plant has self-contained hydraulic, cooling-water and compressed-air services. These, together with the mill motors, generators, oil hydraulic and lubricating equipment, are housed in a separate building. To reduce production delays and maintenance costs to a minimum, attention has been paid to the installation of single-purpose equipment wherever possible. A distinctive feature of the new plant is the extensive use of special manipulating machinery fitted with individual oil hydraulic units. Economies in power have been effected by the use of air-loaded accumulators in conjunction with the main hydraulic plant to regulate the operating pressure in accordance with the section being made. Power-operated controls and automatic

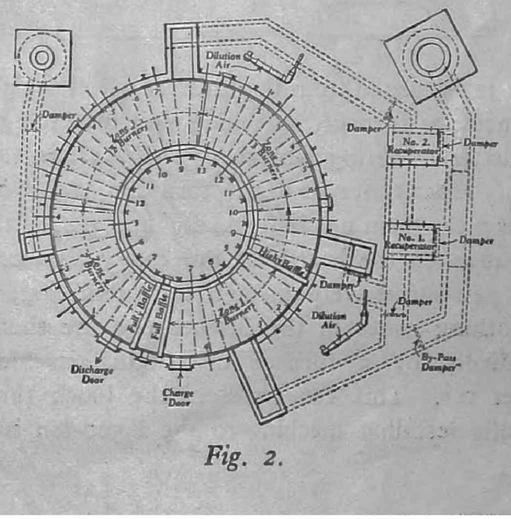


Fig. 2.

equipment are incorporated to eliminate physical fatigue and facilitate the continuous maintenance of high rates of production.

SEQUENCE OF OPERATIONS

The sequence of operations should be read in conjunction with Fig. 9. The two control rooms A and B, shown in this plan, are well placed for observing the operations which they control. The furnace control room A enables the operator to view the charging and discharging gear, and the main control room B, which is placed high up, allows the operators to watch their presses and mill. The blocks of steel from which the wheels are made are cut or broken from an octagonal or duodecagonal cross-section ingot of which the width across the flats varies from $12\frac{5}{16}$ in. to 18 in. The block weight is calculated from the finished wheel weight with allowances for furnace, punching and machining losses. The blocks in the ingot-breaking shop, *a*, are taken by a gravity roller conveyor to the furnace charger *b*. The charger picks them up individually and places them in radial rows on the hearth of the rotary furnace. The blocks pass successively through the preheating, heating and soaking zones in the furnace and are then taken individually by a furnace discharging machine to a transfer car. This car transfers the block through a hydraulic descaling machine to the 8,500-ton hydraulic press.

Fig. 3. HOT BLOOM BEFORE SLABBING.

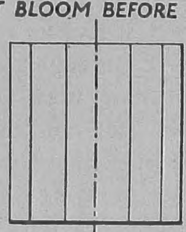


Fig. 4. SLABBING AND DUMPING.

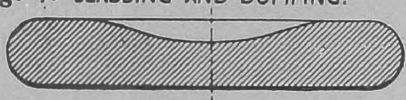


Fig. 5. FORGING.

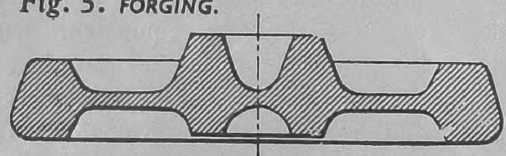
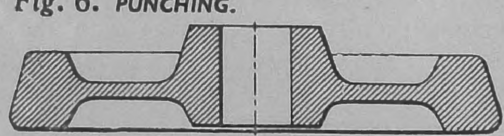


Fig. 6. PUNCHING.



After slabbing down between flattening tools, from the shape shown in Fig. 3 to that shown in Fig. 4, the bloom is transferred to forging tools mounted on sliding tables on the bed and crosshead of the press. Under increased pressure the slab is forged to finish the hubs, partially from the bore and prepare a rim section suitable for rolling, as shown in Fig. 5. The forging is transferred from the dies to a live-roller table by an unloading mechanism and is then conveyed to the 1,000-ton punching press, which is of the upstroking type with hub-clamping dies. The punched slug falls through a hole in the lower die to a quenching bin. The punched wheel Fig. 6 then passes, on a roller table, through a tunnel beneath the main control room to a position from which it is loaded into the rolling mill. In the mill the rim section is reduced in volume and rolled to the required contour, with an accompanying increase of wheel diameter. An unloading mechanism takes the rolled wheel from the mill and, by means of a transfer car, the almost completed wheel is carried to the 2,000-ton dishing press. The wheel rim is clamped by dies in the press and pressure applied to the hub and "plate" to produce the correct hub off-set and plate contour. Finally, after dishing, the wheel is stamped with identification numbers and transferred either to a five-station rim-chilling machine or direct to a cooling bed.

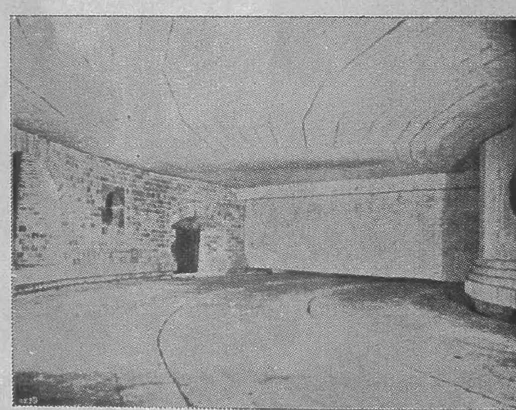


Fig. 7. Interior of Rotary-Hearth Furnace.

FURNACE-CHARGING MACHINE

The furnace-charging machine (*b* in Fig 9) consists of a cable-driven carriage mounted on a fixed but abjustable bridge. The peel hoisting mechanism and the oil hydraulic equipment for the gripping motion are mounted on the carriage. The peel structure is pivoted at the rear and is fitted with forging manipulator sheaves at the furnace end. Mounted on the peel structure is the peel proper, equipped with tongs which ensure accurate spacing of the blocks on the hearth and permit a straight withdrawal from the furnace. Rotation of the

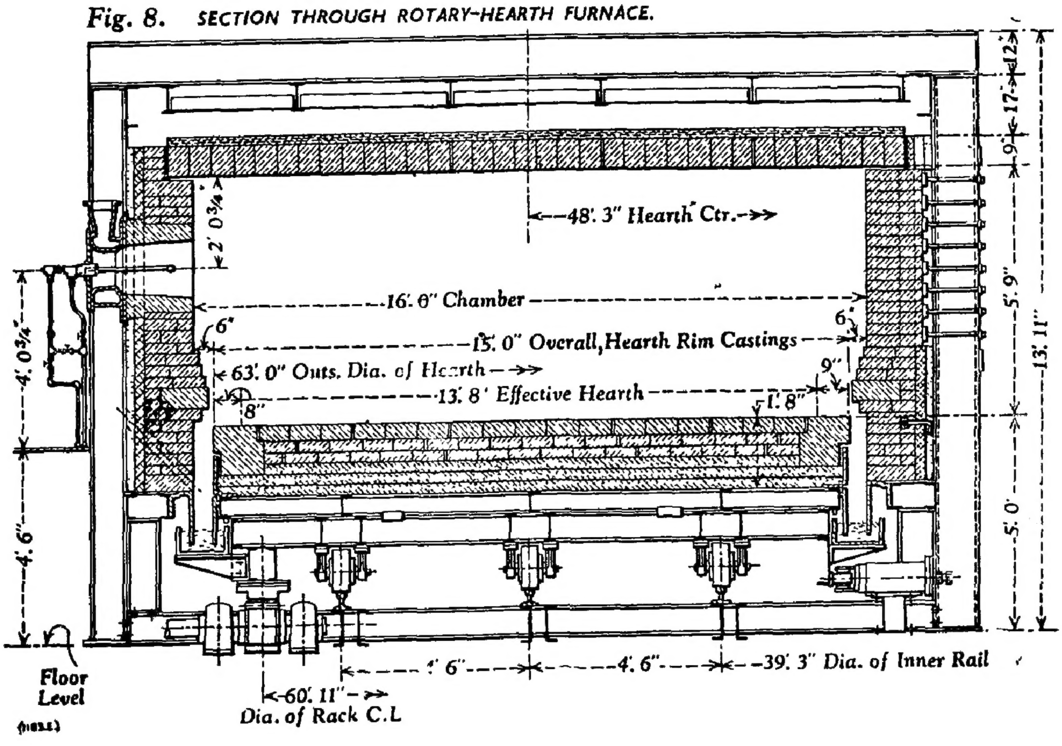
peel through an arc of 90 deg. is effected by means of cams and rollers operated by the action of hoisting or lowering the peel structure.

The machine is arranged to complete automatically a cycle of operations initiated by the operator after he has indexed the rotary hearth. With the tong head resting on a centring cam and the block lying on the roller conveyor against the conveyor and the stop, the cycle commences with the lifting of the furnace charging door. The tongs grip the block at a fixed distance from its base. The peel structure is lifted and the tongs rotate 90 deg. to bring the axis of the block into the vertical position and the base of the block to a fixed distance above the furnace-hearth level. The carriage moves to the extreme forward position in order to bring the first block to the innermost position on the hearth. Completion of forward travel actuates first the lowering of the block to the hearth, this motion, in turn, releasing the grips. At the end of the release stroke the carriage returns to its original position and lowers the peel structure until the tong head again rests on the centring cam. The cycle is then repeated and a second bloom is charged. The forward travel of the carriage is sequence-controlled from a multiple-cam limit switch of the vernier-setting type. After the seventh or outside bloom has been charged the furnace door is closed and the peel and tong-head cooling sprays are brought into action. The carriage travel control has provision for variable radial spacing of the blocks on the hearth and for charging any number up to a maximum of seven blocks.

ROTARY-HEARTH FURNACE

The furnace, built by the Salem Engineering Company, Limited, Milford, Derby, is the largest of its kind in the country. It has a rated heating capacity of 40 tons of steel an hour at a maximum temperature of 1,280 deg. C. The diameter over the outer buckstays is 69 ft. and the hearth is 15 ft. wide and has a mean diameter of 48 ft. 3 in. The charging and discharging doors are set at an angle of 30 deg., as shown in the plan, Fig. 2, and there are two suspended baffle walls between the doors, built radially across the furnace; one of these is shown in Fig. 7. Small doors in the inner and outer walls between the baffle walls facilitate cleaning of the furnace hearth while the furnace is in operation. The furnace has four firing zones and is fitted with 39 steam atomising burners designed for burning heavy fuel oil. Preheated air for combustion is obtained by using part of the heat contained in the waste gases, two Newton Chambers needle-type metallic recuperators being used as heat exchangers, as shown in Fig. 2. Preheated air is used in the heating zones and atmospheric cold air in the preheating and soaking zones. The hearth, which is of the Salem floating type, is driven at diametrically-opposite points by a 27-h. p., motor coupled through a differential gear and line shafting, all in the furnace foundation. There is a 200-to-1 reduction worm-gear driven by V-ropes at each end of the shafting. A pinion on the worm-gear output extension shaft engages a rack mounted under the rotary-hearth structure, as shown in Fig. 8. The hearth is carried on 108

Fig. 8. SECTION THROUGH ROTARY-HEARTH FURNACE.

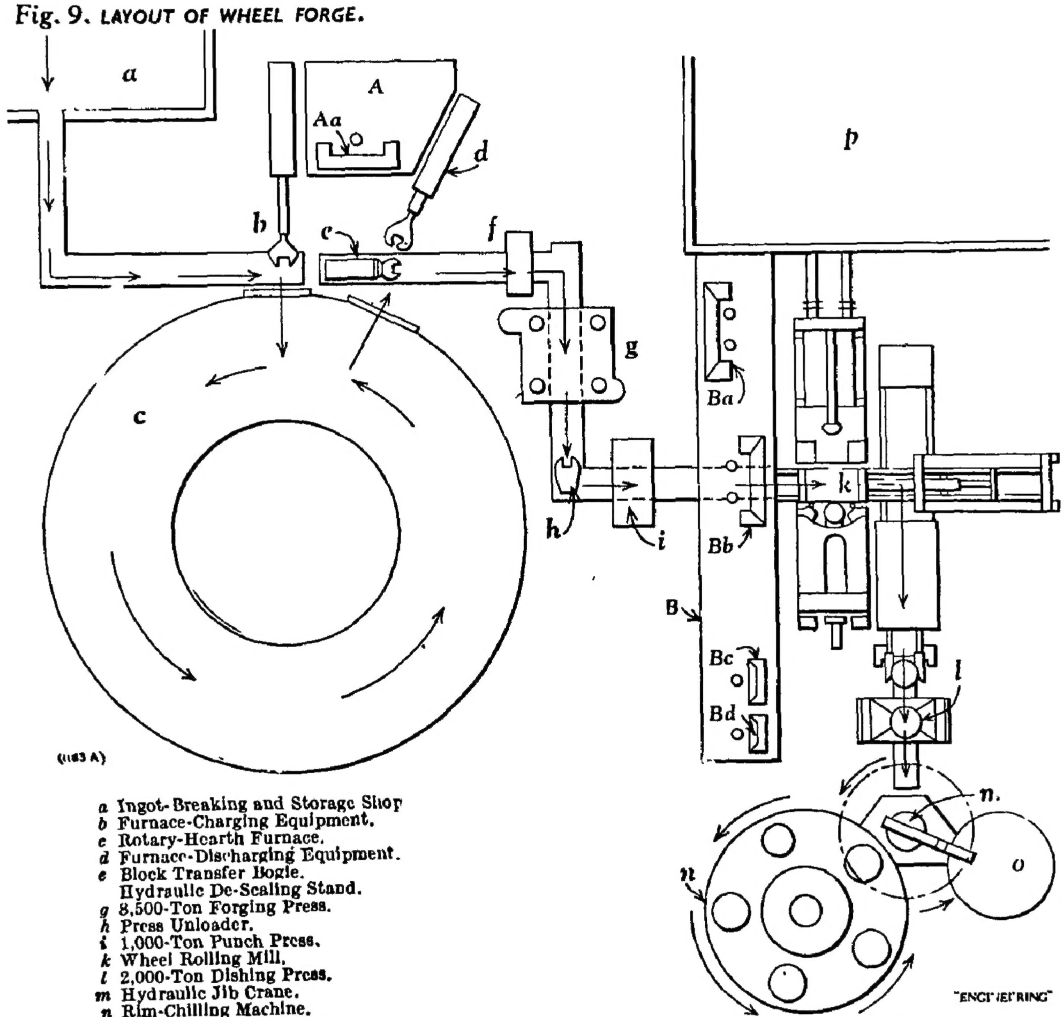


wheels fitted with taper-roller bearings running on circular rails.

Fifty-three rows of blocks are arranged in the 330 deg. between the charging and discharging doors, giving a maximum of 371 blocks in the furnace. The rows of blocks are carried through the heating and soaking zones of the furnace by progressive indexing of the hearth at a rate corresponding to the output of the plant. At a production rate of 60 pieces per hour the heating time of the blocks is about 6¼ hours. The furnace is equipped with Honeywell Brown "Electronik" temperature controllers and Electroflo fuel/air ratio controls in each zone, and with Electroflo automatic furnace pressure control operating on the recuperator dampers.

The roof, shown in Fig. 8, is of the flat suspended-arch type and is formed of tongued-and-grooved interlocking blocks. The tongues and grooves are tapered in two directions. The larger blocks connect with the supporting structure by means of mild-steel hangers and clips, the hangers having toggle joints which, by a hinge action, give maximum movement in all directions to correct for expansion and contraction. The furnace walls are carried on the sand-seal dipper castings. The inner wall forms a polygon of flat vertical panels and is made of tongued-and-grooved interlocking bricks. A four-piece refractory burner is placed in the centre of each panel. The vertical joints at the junctions of the panels are made of dovetailed blocks which are anchored to the inner buckstays by alloy bolts to prevent outward movement due to expansion. The furnace foundation has been designed as an open pit about 7 ft. deep to ensure adequate ventilation under the hearth and to prevent overheating of the steel structure and wheel bearings. Lubrication of the latter is also facilitated. The inner buckstays are carried on piers. Steel beams span the space between these piers and the outer foundation wall forming the bottom ties of the furnace bindings as well as supporting the track rails.

Fig. 9. LAYOUT OF WHEEL FORGE.



a Ingot-Breaking and Storage Shop
b Furnace-Charging Equipment.
c Rotary-Hearth Furnace.
d Furnace-Discharging Equipment.
e Block Transfer Bogie.
Hydraulic De-Scaling Stand.
g 8,500-Ton Forging Press.
h Press Unloader.
i 1,000-Ton Punch Press.
k Wheel Rolling Mill.
l 2,000-Ton Dishing Press.
m Hydraulic Jib Crane.
n Rim-Chilling Machine.
o Final Lay-Down Station.
p Motor and Pump Room.

A Furnace Control Room.
Aa Handling Operator's Desk
B Main Control Room.
Ba Press Control Desk
Bb Mill Control Desk.
Bc Press Control Desk.
Bd Chiller Control Desk.

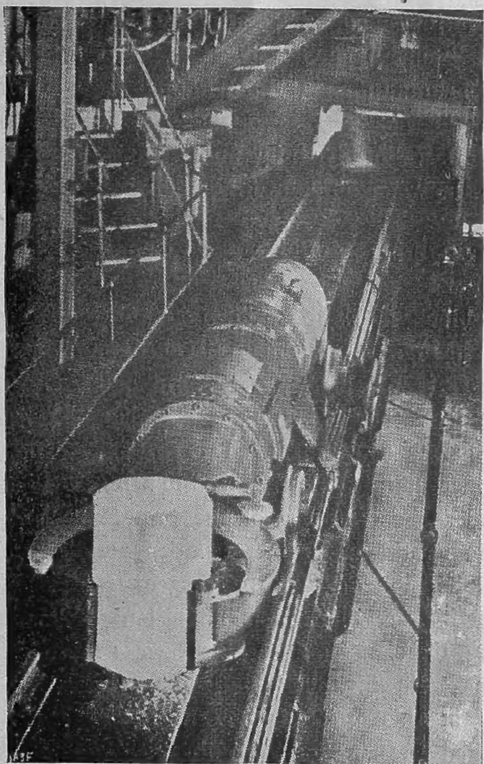


Fig. 10. Transferring Block from Furnace to Press.

FURNACE-DISCHARGING MACHINE

The heated blocks are removed from the furnace by a high bridge-type discharging machine of 1-ton capacity. The general design of the machine is similar to that of the charging machine, having a cable-driven carriage in which is mounted a rocking peel structure. The hoisting of the peel of the discharging machine, intended merely to clear the hearth, is effected by eccentrics mounted on extension shafts of a worm reduction gear coupled to a 10-h. p. direct current motor. The grips are operated by a Vickers-Detroit combination pump, the small-volume portion being used to maintain the grip while the large-volume pump is unloaded to the tank. The grip cylinder is controlled by a solenoid pilot-operated fourway valve. The carriage—a welded box-type structure—forms the oil tanks for the gripping gear. Travel of the carriage to the predetermined billet position is controlled by a multiple-cam limit switch with vernier setting adjustment and "slow down" and "stop" rings for each billet position. The grips, at the withdrawn position, are aligned over a vertical air-operated ram which has a stroke of 30 in. Operation of the elevator ram is interlocked with the discharger carriage in order to prevent the release of the block when the elevator is not at the top of its stroke, though permitting the operator to commence the discharging cycle before the elevator is raised.

To commence the discharge of a row of blocks, the carriage travels to the outermost hearth position with the peel lowered. Completion of the travel initiates the gripping, which is followed by hoisting the peel, withdrawal to the elevator and lowering the peel. If the elevator is raised, the release of the grips and subsequent lowering of the elevator take place automatically, together with closing of the furnace door. The operator then initiates transfer of the block to the descaler and press, and the discharging machine may be restarted. After the furnace door has been rehoisted, the machine commences its inward travel again and completes its cycle by with drawing and holding a second block over the elevator until the latter is automatically raised, following the return of the transfer car to the furnace. The cycles are repeated until the innermost block in a radial row has been discharged. A system of signal lamps on the control desk shows the operator at a glance how many blocks remain to be charged and discharged at any time. The hearth is not index until a clear space is indicated at the discharging position. Complete sequence controls on each machine automatically reset for the next cycle of operations. A rotating dial mounted outside the control room is geared to the hearth and is used for maintaining a continuous indication of the progress of the blocks through the furnace and of the operation of the hearth-indexing limit switches. Details of the blocks are chalked on this dial.

TRANSFER CAR

A tubular fabrication mounted on four flanged wheels forms the body of the transfer car, which is shown in Fig. 10. The front bulk-head of the body carries the grips. The operating cylinder and solenoid valve are mounted in the leading compartment, and the centre compartment forms the oil supply tank. A Vickers-Detroit combination pump and valve unit is flange-mounted on the rear bulkhead. The pump motor, pressure switches and electric junction box, enclosed by a ventilated cover, are mounted on a platform at the rear. The car travels on flat-bottom rails on a fabricated track structure 67 ft. 2 in. long, of which one end is built into the hydraulic descaler. Live rails along one side of the track supply current to the pump motor and the sequence-control circuits. The other side of the track is fitted with angle guides for wire ropes which attach the car to a drawbench-type winch unit mounted at the furnace end of the bridge structure. An electrical contact switch at the furnace end of the track is automatically operated by the transfer car to control the supply of cooling water to the peel of the discharging machine. Similar track switches at the press end of the track are used for slowing down the car

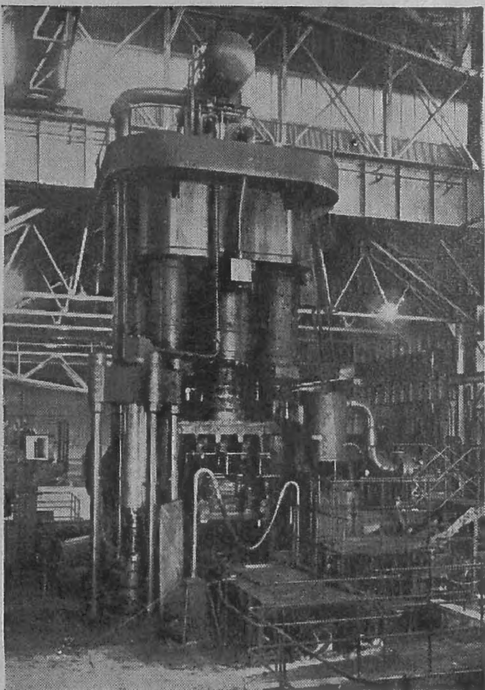


Fig. 11. 8,500-Ton Forging Press.

prior to it entering the descaler, for operating the descaler control valve and for finally stopping the car when the block is over the 8,500-ton press slabbing die. Similar switches are used at the furnace end of the track for slowing down and stopping the car on its return journey to the furnace and for interlocking duties. Release of the blocks from the car grips, which is followed by the automatic return of the car to the furnace, is under the control of the operator of the 8,500-ton press.

HYDRAULIC DESCALING MACHINE

The hydraulic descaling machine has six Harland-Aldrich No. 2 nozzles, each of 27.2 gallons per minute capacity, mounted in an adjustable header pipe above the block, and six similar nozzles in a fixed header pipe arranged 6 in. below the lower surface of the block. The operating gear is mounted in a box-shaped fabrication, on top of which is fitted the upper-nozzle adjusting gear and a Schneible Multiwash collector with an extractor fan to prevent the steam generated in descaling from obscuring the view of the press operator. The steam is condensed in the collector and the waste water and scale are guided to fall into a scale bin located below floor level, the water draining to the main sump. Canal water is used for descaling, at a pressure of 1,500 lb. per square inch. The water is drawn from the main cooling-water supply pumps by a Berry three-throw pump delivering 34 gallons a minute into a weight-loaded accumulator of 47.7 gallons capacity. Supply to the nozzles is controlled by a Hunt "Quick-as-Wink" air-operated valve and the system is fitted with a priming pipe and non-return valve to maintain water in the nozzle headers and to eliminate hydraulic shock. Descaling is fully automatic, the transfer car turning the water on and off.

8,500-TON PRESS

The block is slabbed down on the forging press (shown in Fig. 11) between flat dies until the required thickness is obtained; a "dumping" effect is also produced, as shown in Fig. 4. It is then gripped in centring arms and transferred to the lower forging die. The upper sliding table is moved to bring the top forging die under the centreline of the press, and the second forging operation is completed under intensified pressure. Meanwhile, the next to be forged is placed on the slabbing die, and the lower sliding table is moved back to bring the completed forging over the stripping ram and the following block under the press crosshead. A forging at this stage is shown in Fig. 12. At an intensified pressure of 5,600 lbs. per square inch, the maximum load on the press is 8,500 tons. This load can be reduced on smaller forgings by reducing the pressure in the air-loaded accumulators. The press is fitted with four cylinders, having a diameter of $33\frac{3}{8}$ in. and a stroke of 36 in. The "daylight" between the sliding tables is 5 ft. 7 in. and the top and bottom tables have travels of 5 ft. and 9 ft. 6 in., respectively.

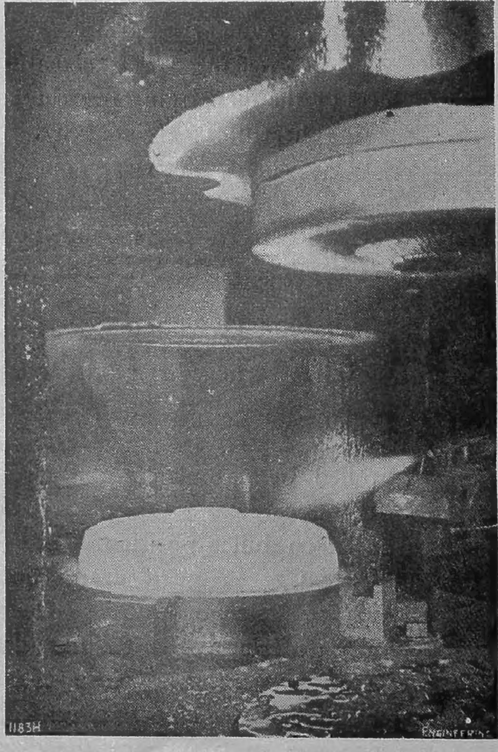


Fig. 12. Forging Produced in 8,500-Ton Press.

The columns are 8 ft. centres and have a minimum diameter of 26 in. The press bed is a fabricated structure made from five castings and plates forming triple-web beams arranged diagonally to take a central load. The press crown is also a fabrication, the four corner castings being joined together with vertical plates to form four triple web beams which transfer the load from the cylinders to the columns.

The crosshead is an one-piece steel casting designed to transmit the load from the four rams, which are located between the columns, to the centre of the crosshead. Built into the crosshead are twin hydraulic cylinders for moving the top sliding table. The lower sliding-table extension on the outgoing side of the press is a fabrication carrying the stripping cylinder. Top-die

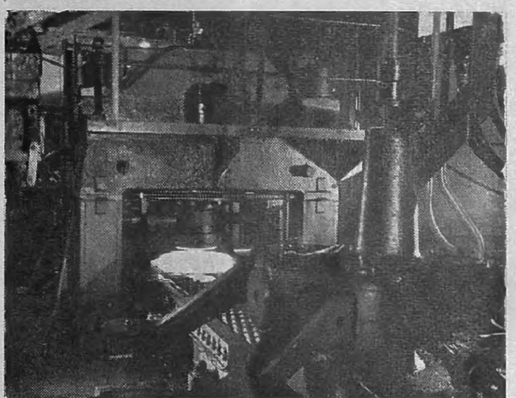


Fig. 13. Forging in 1,000-Ton Punch Press.

cooling equipment is built into the moving guards on the lower sliding table. The water sprays are automatically operated by valves actuated by the table movement. Cooling of the lower dies is effected by spray rings attached to the crosshead and fed through flexible hoses. The spray rings are hinged to facilitate die-changing. Control of these water sprays is by air valves, pedal-operated at the press control desk. The crosshead bushes, which are lined with white metal, and all main glands, are fed with grease from a Trabon automatic system.

The hydraulic intensifier, which has a ratio of 2.87 to 1, gives a pressing stroke of 6 in. The press is equipped with a large pre-fill tank and surge tank. The latter is mounted directly over the pre-fill valves on the press crown to reduce cavitation in the cylinders when lowering the crosshead under pre-filling conditions. All the main hydraulic valves are arranged in the press foundation between the press and the control room. A pressure switch is installed to prevent operation of the intensifier before full accumulator pressure has been developed in the main cylinders. The control gear is electro-hydraulic, using V. S. G. auto-controlled pump and solenoid-operated pilot valves to direct oil to servo cylinders mounted under the main valve spindles. With this system it has been possible to group conveniently all the press controls on a desk. Thus, this stage of forging is placed under the control of one operator who is protected from heat, steam and noise and seated in clean and healthy conditions in the main control room.

On being lifted from the bottom die by the stripping ram, the forging is gripped, lifted further and slewed through 90 deg. by a special machine to bring it directly over the live roller table which runs through the punching press and on to the rolling mill. The press unloader is operated by the punching-press driver, who is seated alongside the 8,500-ton press driver at a common control desk. A double Vickers-Detroit pump driven by a 5-h. p. motor and a single pump driven by a 10-h. p. motor, both of which are mounted, together with the control valves, on a tank in the oil hydraulic room, supply oil to the grip cylinders and to the hoist and slewing cylinders respectively. The roller table, part of which is shown in Fig. 13, is divided into four units each having a separate driving motor. No. 1 section serves as a receiving table from the press unloader. No. 2 section is built into the punching press and mounted on the press column structure. Nos. 3 and 4 tables carry the blank from the punching press under the main control room into position for charging into the mill. Tables 1, 2 and 3 are driven by 10-h. p. alternating-current motors running at 965 r. p. m., giving a surface speed of 192.5 ft. per minute. These tables run continuously. No. 4 table is driven by a 5-h. p. direct-current motor which gives a table speed of 99 ft. per minute. This table is slowed down and stopped by photo-cell equipment to the mill end and is restarted automatically by operation of the mill-loading mechanism.

Fig. 14. Main Control Room.

The punching press is of the upstroking type, equipped with twin 26-in. diameter rams and double-acting pull-back cylinders. The press has a rated capacity of 1,000 tons and a punching stroke 9½ in. at a speed of 3 in. per second. A 100-ton boss-clamping cylinder is mounted in the press crown around a rigid punch stem. Jack cylinders give an approach speed of 6 in. per second. The forging, on arrival in the punching press, is centred by an adjustable stop mechanism and lifted off the live rollers by the lower boss-clamping die. Continued upward movement of the crosshead first clamps the boss and presses the hub agains the rigid punch. When the punch has completely penetrated the boss, the crosshead is stopped by limit-switch control and the forging is then lowered on to the live rollers. In the meantime the centring stop is removed and the forging is allowed to proceed to the mill. The control gear is similar to that used on the 8,500-ton press.

After the forged wheel has left the punching press, it is passed through a tunnel which is underneath the main control room illustrated in Fig. 14, herewith. Then it is rolled to give it the required rim section, as shown in Fig. 15, and finally it is dished in a press to produce an offset of the hub in relation to the rim, as shown in Fig. 16. If the rim is to be chilled the wheel is passed to a chilling machine, otherwise it is delivered directly to a "lay-down" station. These processes, which are regulated entirely from the main control room, where the operators work in white overalls and comfortable surroundings, are described below, together with the hydraulic and compressed-air plant which makes possible the remote and automatic control which is such a notable feature of the forge.

Fig. 15. ROLLING.

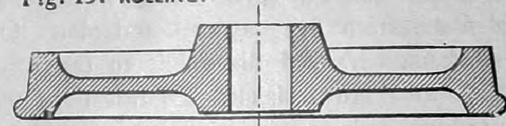
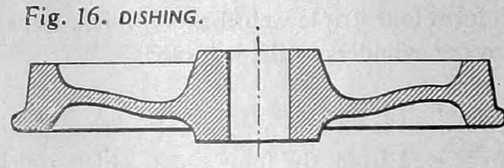


Fig. 16. DISHING.



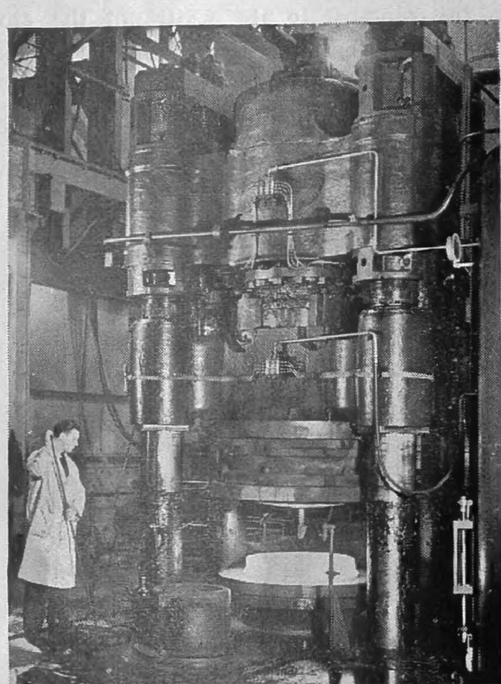


Fig. 17. 2,000-Ton Dishing Press.

ROLLING MILL

The mill loading mechanism is mounted under the main control room, its main supporting frame being pivoted at the mill end and suspended at the other end from a curved track. This arrangement facilitates the alignment of the machine in relation to the mill rolls. A carriage actuated by a hydraulic cylinder carries a self-centring grip mechanism which is rotated to enable the grips to clear the wheel forging. A separate oil hydraulic unit, located in the motor room, has a Vickers-Detroit double pump for the grip mechanism and a separate pump for operating the twisting and travelling cylinders. All these cylinders are mounted in the movable carriage and fed through flexible hoses. The travel stroke is arranged to take the forging from the end of roller table to the centre-line of the mill, where the forging is deposited on forks attached to roll carriages. The rolling mill is illustrated in Fig. 18, which also shows the operators at their control desk.

The forged rim is reduced in cross-sectional area in the mill and formed to the required shape, as shown in Fig. 19, by driven edging rolls which bear on the front and back faces and on the inside contours of the rim, and by the load on two pressure rolls which bear on the tread and form the flange. The mill, of Taylor-Kendall design, has also a driven main roll mounted in an adjustable carriage and two guide rolls mounted on a separate carriage but sliding on the same ways as the main carriage. The hydraulic pistons for the guide-roll carriages are attached to the main-roll carriage to give movements relative to that carriage. The mounting arrangement of the guide rolls permits their retraction behind the main roll to facilitate loading and unloading of the mill. The arrangement adopted reduces the handling time at the mill and simplifies the handling equipment. Pressure regulation on the carriages during rolling controls the formation of the section and the rate

of expansion of the wheel diameter. Indicating equipment is built into the mill to show the inside diameter of the rim, and mill setting scales are mounted on the side of the main stand for rapid setting-up to suit varying rim widths and roll diameters.

Each carriage has a self-contained oil hydraulic unit comprising large-volume low-pressure pumps for rapid-traverse duties and small-volume high-pressure pumps for maintaining pressure during rolling. The pumps, together with the electrically-operated control valves, are mounted on tanks which contain all the system connections. Only the cylinder piping and remote-control drains are located outside the motor room. Cylinder

Fig. 18. Rolling Mill and Control Desk.

pressures are remotely controlled at the mill desk by adjusting venting valves coupled to Vickers-Detroit "hydro-cushion" relief valves which are mounted on the operating side of the cylinders.

The top and bottom edging rolls are each driven by a 400-h. p. direct-current motor having a speed range of 690 to 860 r. p. m. These motors, during rolling, are coupled in series across a 480-volt generator. The motors drive through a primary reduction gear and wobbler shafts which are coupled horizontally to spiral-bevel pinions engaging wheels mounted on the roll shafts. The edging-roll shafts are inclined at 35 deg. to the horizontal plane and are mounted in quill castings which also form the bevel-gear castings. At the roll end of the shafts are four-row Timken "balanced-proportion" roll-neck bearings. Steep-angle taper-roller bearings are mounted in a cartridge behind the bevel gears. The input bevels are mounted in the quills on stub shafts carried in cartridge-mounted taper-roller bearings. The main roll, which is the only other driven roll, is carried on a tapered extension of a vertical shaft mounted on a Timken two-row "balanced-proportion" roll-neck bearing with a double-row taper-roller bearing at its lower end. A single-helical gearwheel is mounted on the roll shaft and engages a pinion on a vertical intermediate shaft which also carries a spiral-bevel wheel. A bevel pinion is mounted horizontally on a shaft coupled to a 150-h. p. mill motor having a speed range of 460 to 1,150 r. p. m. This motor is fed from a separate generator mounted on the main set and has a "shovel" characteristic to prevent it taking load from the edging-roll drive motors and overloading itself. All driven-roll speeds are independently variable and the overall mill speed is also abjustable to maintain pre-set roll speed ratios, modified to suit the various roll diameters.

The primary gearbox, edging-roll quills and main-roll gearbox are fed with lubricating oil from a De Laval circulating unit made by Denco Engineering Services, Limited, Hereford, and installed in the motor-room basement. The unit is fitted with duplicate gear-type pumps, a motor-driven filter, steam-heating coils and oil cooler. It has automatic control equipment to bring the second pump into operation in the event of loss of pressure and is provided with audible warnings for excessive pressure. The millmotor controls are interlocked with the lubrication system to prevent the starting of the mill before the lubrication system is operating.

The three roll carriages slide on round ways and are fitted with bronze bushes pressure-fed with grease from a Trabon automatic reversing lubrication system. The bushes are fitted with wiper seals. It is claimed that this method of mounting the carriages facilitates effective lubrication and maintenance of roll alignments, with a consequent improvement in the consistency of product dimensions. Both edging-roll quills are mounted on pivot shafts having an eccentric centre portion for quill adjustment. Rocker bars at the roll end of the quills are connected through adjustable pitman arms to the screw-down crankshafts. The crank-shaft for the lower roll is connected through a wormgear to a 5-h. p. mill motor forming a drive for retraction of the roll. The

Fig. 19. Rolling the Rim Section on a Wheel.

Fig. 20. Gauging Wheel after Dishing.

upper quill is similarly connected to a 20-h. p. direct-current mill motor of 450/1,200 r. p. m. This motor is coupled to a Metadyne set having a 35-h. p. driving motor, a 0/17-kW 0/230-volt generator, a 5-kW 250-volt exciter and a 600-watt 150-volt Metadyne exciter. Controls are provided to give "instantaneous" edging, which produces a parallel wheel web, or "continuous" edging to produce a tapered web by the use of on electronic ratio controller coupled to the wheel-growth dial. A separate controller is provided for manual adjustment of the top screw-down motor. Further information on the mill and screwdown drives is being prepared by the Metropolitan-Vickers Electrical Company, Limited.

2,000-TON DISHING PRESS

The wheel, on completion of the rolling, is transferred to a flat-topped car by an unloading mechanism similar in design to the one used for loading the mill. This car, which is cable-driven, takes the rolled wheel over the bottom die of the dishing press shown in Fig. 17. A swinging arm is brought into position by the dishing-press operator, who then returns the car to the mill end of its track. The car, in returning, slides from underneath the wheel, which is restrained by the stops, and the wheel falls on to the die. The lower sliding table of the press in then moved, bringing the die under the crosshead ready for the next forging operation. The dishing operation changes the web of the wheel from a flat disc to a cone shape and sets the boss offsets, as shown in Fig. 16. The press has a two-piece top die mounted in a holder on the crosshead and has a bottom sliding table having a stroke of 6 ft. on which are mounted the bottom dishing die and a stripping stool. The press has a rated capacity of 2,000 tons at an accumulator pressure of 2,200 lb. per square inch, intensified to 6,000 lb. per square inch on a single ram $31\frac{5}{8}$ in. in diameter with a 2 ft. 7 in. stroke Hydraulic pull-back cylinders are mounted on bolsters fastened to the top of the press columns. The intensifier has a $19\frac{1}{2}$ in. diameter low-pressure moving ram and a $11\frac{3}{4}$ in. diameter high-pressure stationary ram. The press control system is similar to that used on the 8,500-ton press, except that a pre-fill tank only is provided.

Mounted over the dishing-press table cylinder is a 1-ton hydraulic jib crane with a guided hoist in the form of a box-section column sliding vertically in guides at the end of the jib arm. To the bottom of the column is attached a set of automatic tongs which are adjustable to suit varying wheel diameters. A hydraulic cylinder mounted vertically on the jib mast is coupled to the column by wire ropes and fed with hydraulic oil through a rotary distributor which is mounted on top of the mast. The crane is slewed by a V. S. G. transmission unit driving through a planetary gearbox, the outer case of which is held by a friction brake to prevent damage in the event of fouling the jib arm. The crane is placed in such a way that the automatic tongs may be brought directly over the dishing-press stipping stool, the chiller loading station and a final lay-down station. These three points are at 120-deg intervals around the 14-ft. diameter circle described by the jib. The slewing controls are arranged to give progressive movements of the jib through 120 deg. in either direction, thus enabling dished wheels to be taken either to the rim-chilling machine and from there to the laydown station, or directly from the dishing-press to the lay-down station, according to the heat treatment required. Before transfer from the dishing-press stool the wheel is hot-stamped with the cast number of the steel. The stamps are mounted in the jaws of a toggle mechanism operated by an oil hydraulic cylinder, the complete gear being mounted in a carriage slung under the crane structure and traversed by a pneumatic cylinder. Stamping is carried out when the wheel on the dishing-press stripping stool has been moved from under the press crosshead. Gauging of a wheel after dishing is illustrated in Fig. 20, herewith.

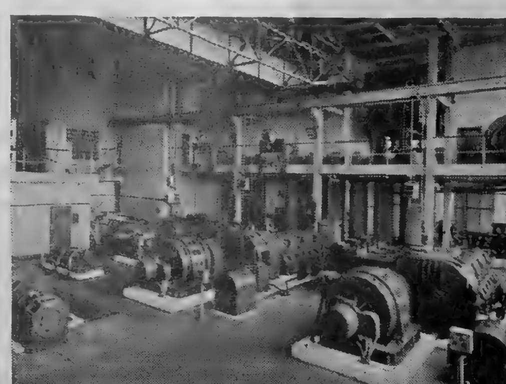


Fig. 21. Motor and Pump Room.

RIM-CHILLING MACHINE

The rim-chilling machine has five chilling stations mounted on an electrically-driven turntable 14 ft. in diameter. At each chilling station is placed, a set of three tapered rolls, one of which is driven by an electric motor mounted inside the turntable hood. Box-section spray rings are mounted on the roll housing and coupled to a pump located inside the turntable hood through a solenoid-operated valve. This pump, rotating with the table structure, draws water from an annular tank located around the vertical post which carries the weight of the whole machine. At the centre of each chilling station is a set of loading forks under which is mounted a live-roller centre. At the point of intersection of the spray-ring pitch line and the jib-crane radius a fixed cam is arranged to lift the forks above the level of the live rollers in readiness to receive the wheel from the jib crane. After the wheel has been deposited on the forks the main turntable is indexed one-fifth of a revolution, lowering the forks and leaving the wheel on the rotating rollers. The water-spray valve of that station is automatically switched on, together with the spray timing device which holds the spray valve open irrespective of further movement of the station.

As the first station is carried away from the loading point the fifth station goes into the loading position and the wheel is lifted from the live rolls by forks, ready for transference by a hydraulic jib crane to the final lay-down position. The water from the spray rings runs down the hood at the main turntable structure into an outer annular tank fitted with overflow pipes which act as a return to the main drainage sumps. The outer casing of the chiller dips into the return water tank, forming a water seal, and the underside of the hood is ventilated by a fan mounted on the cantre of the main hood structure. This flow of water is used to assist the flushing of scale from the mill and press foundations. The main turntable drive consists of a 10-h. p. motor with a brake, coupled by means of an extension shaft to a wormgear unit mounted underneath the turntable hood, a pinion on the worm-wheel extension shaft meshing with a ring gear fastened to the inside of the rotating hood structure. A set of collector rings mounted on the vertical centre column supplies current to the five roll motors, the spray pump and the spray valves. The timers are located in the main control room on the chiller control desk. The latter also carries the turntable rotation controller and the hydraulic jib-crane controls. The final lay-down station consists of a simple turntable carrying three stacking pegs. The pegs, designed to receive five completed wheels, have their upper ends shaped to suit a set of automatic tongs fitted to the overhead crane used for removal of the completed stacks of wheel to the cooling beds.

MOTOR AND PUMP ROOM

The Main pumps and accumulators for the press hydraulics, which are designed to operate up to a maximum working pressure of 2,200 lb. per square inch, are arranged to form two independent systems with separate control gear. The large system comprises five strip-wound air vessels, each with a capacity of 68 cub. ft., and one strip-wound water vessel of a similar capacity. The small system comprises two 68-cub. ft. strip-wound air vessels and one 25-cub. ft. solid forged water vessels. These vessels are shown in Fig. 21. The ratio of air to water volume is such that a pressure drop of 10 per cent. is allowed over the normal operating levels. The 68-cub. ft. vessels are made of welded plates covered by four layers of special-section rolled-steel strip. A three-stage Hamworthy air compressor with a capacity of 18 cub. ft. per minute is used for charging the air vessels. The water and air vessels are connected to mercury level-control pots of Vickers-Armstrongs design for control of the pumps and accumulator automatic stop valves. The pumps are unloaded by lifting the suction valves at a predetermined water level. Contacts in the mercury pots shut down the pumps at extra high level to avoid overfilling. Should the pumps fail to meet demands on the system, further contacts are arranged with close the accumulator automatic stop valves, thus isolating the water vessels from the press supply lines.

The large accumulator system is fed by two three-throw Vickers-Armstrongs pumps, each having a capacity of 400 gallons per minute at 2,200 lb. per square inch. The rams are 4⅝ in. in diameter, with a stroke of 21 in., and the crankshaft speed is 110 r. p. m. Each pump is driven through single-reduction double-helical gears by a Metropolitan-Vickers 6,600-volt slip-ring motor of 750 brake horse-power at 740 r. p. m. The small accumulator system is fed by a Davy three-throw pump of 160 gallons per minute capacity at 2,200 lb. per square inch. The pump is driven through a single reduction double-helical gear by a Metropolitan-Vickers 6,600-volt slip-ring motor developing 275 h. p. at 740 r. p. m.

It is possible, by means of the independent accumulator systems, to operate the 8,500 ton press at lower pressures than the punching and dishing presses, and thus to consume less power in the forging of smaller products. The accumulators can be connected together

to operate as a combined system by equalising the air pressures and opening a stop valve in the water lines. The pumps and accumulators are housed in the motor room and the valves are arranged under the vessels in a basement which extends into the main pipe subways and the press foundations.

New 2-ft. diameter supply and return culverts have been constructed between the motor room and the Bridgewater Canal, which forms the south-west boundary of the works, and two Gwynnes centrifugal pumps, each with a capacity of 1,000 gallons per minute, are coupled through Auto-Klean strainers to supply cooling water for the rolls, dies, chilling machine, etc. All waste water is returned to a scale sump through open troughs constructed in the plant foundations. The scale is collected in containers which are lifted out of the main return sump and allowed to drain before being emptied into rail wagons. The return water is lifted from the deep sump to an oil-separator chamber by two float-controlled Gwynnes vertical-spindle pumps, and then returns by gravity to the canal.

An Ingersoll Rand 90 h. p. three-cylinder air-cooled compressor equipped with an after-cooler and air receiver supplies compressed to the forge for operating the elevator at the furnace discharger. Compressed air is used for operation of the cooling-water valves and the stamper traverse cylinder, and is also piped to convenient points for general service. The motor room is supplied with clean air through a Visco filter at 30,000 cub. ft. per minute by a fan designed to maintain a positive pressure in the room.

The main 6,600-volt switchgear, the 400-volt switchboard and the rolling-mill control board are mounted on a balcony over the oil hydraulic room. The latter is at motor-room floor level but is enclosed from the main room and houses the tank units carrying the Vickers-Detroit equipment and the oil supply tank for the V.S.G. systems. In the basement beneath the oil hydraulic room is housed the mill lubrication equipment, the mill and press greasing equipment and the V. S. G. oil hydraulic pumps. Care has been taken in preparing the general lay-out to give ease of access to the extensive pipe and cable runs.

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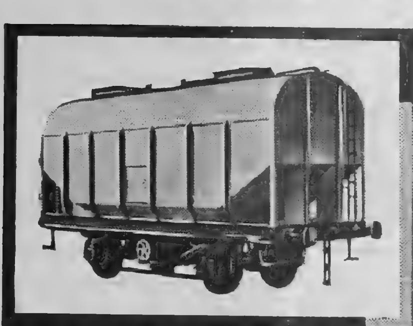
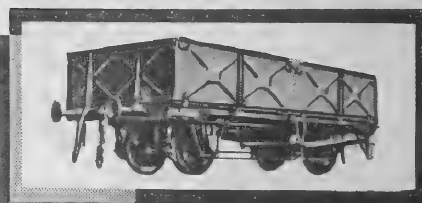


20-ton capacity Bulk Grain Van to the order of British Railways.



F.J.S. Low-sided Open type Wagon as used by Queensland Government Railways, Australia.

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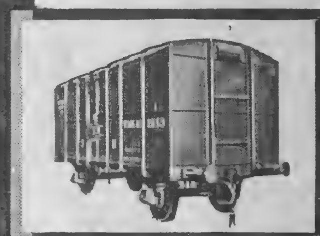
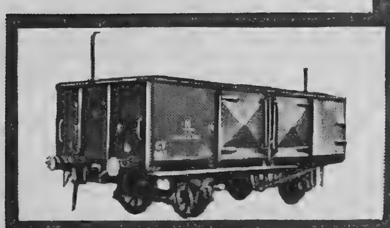
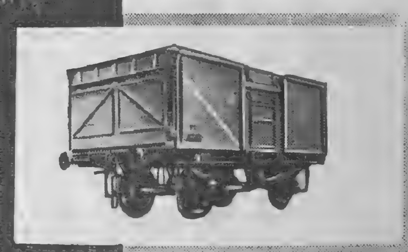


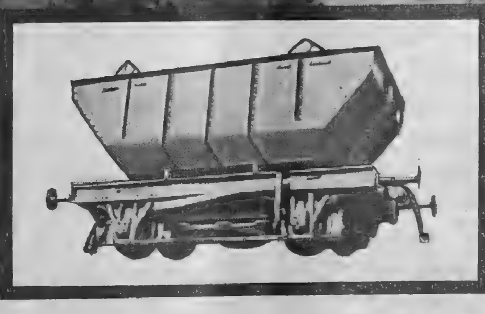
Broad gauge covered Wagon type C.R. as used by Indian Railways.



22-ton G.Y. type Wagon as used by Victoria Government Railways, Australia.



16-ton all steel Mineral Wagon, 50,000 of which have already been built in our Paisley works to the order of British Railways.



V. J. M. Hopper type Wagon with Drop Bottom Door as used by Queensland Government Railways, Australia.

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Progress of Rumanian Rolling Stock Industry

ALTHOUGH in Rumania the rolling stock industry is of long standing, in the period after World War Two it has been greatly developed. This development came as a consequence of the increase in the raw material resources, the strengthening of the heavy industry and the refitting of the works with modern means of production. In this way it became possible for the home industry to cover all the requirements of the domestic network and at the same time to turn out a constantly growing number of locomotives and wagons for export.

As a result of the development of this industrial branch, today our export programme of rolling stock includes serially made products of well studied design, whose efficiency in service has been proved by the excellent results given on the home network. Rumanian made rolling stock offered for exportation includes steam, Diesel and Electric locomotives and common and special type passenger cars and freight trucks.

From among the range of *locomotives for fast trains* we should mention the types ID2 and 2CO locomotives. Both are locomotives with superheated steam and twin cylinders. Their top speed is 110 respectively 100 km/h and they have a high acceleration power. Both types have a pressure of 17-18 tons per axle. On the home network their combined coal and liquid fuel burning device has proved to be very satisfactory. The usual outfit of the locomotives includes Knorr brakes central lubrication, light installation with turbine generator, steam heating, sanding device, etc.

The best known *freight train locomotives* and the two *types IEO and OEO* also superheated steam locomotives with twin cylinders. Type OEO is made also for wide gauge and in this design it has a traction power at hook of nearly 19,000 kg. The top speed of these locomotives is between 65-80 km/h. The strong built of these two types of locomotives makes them very suitable for freight transports over long distances.

Diesel locomotives are built in two similar models. Such is the case of types LD-760 and LMK-2 of which the first one is a forestry work locomotive of 760 mm. gauge, type LMK-2, of 600 mm. gauge is designed to work in mines and on building sites, these two locomotives have certain different characteristics concerning the outer dimensions, power transmission and weight, but both types are equipped with the same engine. That is the well known KD-35, four cylinder, four stroke Diesel engine which has prove its high technical qualitie in the thousands of Rumanian tractors of the same mark. These engines develop 35 HP at 1400 r. p. m. The top speed of both locomotives is 12.6 km/h and the maximum tractive power at hook 1400 kg.

The two *electric locomotives with battery, types LAM-2 and LAM-8* are fire damp proof and consequently may be used in any mine. As concerns type LAM-8 we should especially mention its compact design (length 4.3 m, width approx. I m). The two motors develop a a total power of 17 kw. giving the locomotives a maximum tractive power of 1080 kg. Each locomotive is supplied with two interchangeable batteries which can be loaded in turn without need to interrupt the use of the locomotive.

The railway cars and trucks made on the Rumanian P. R will satisfy all the requirements of a modern railway network. The first and second class passenger cars have as distinctive feature their very comfortable arrangement. The third class cars have upholstered seats, low pressure steam heating and Dick system electric lighting. This car is made entirely of metal and is mounted on two bogies with 2 Gorlitz axles each, and 3m distance between the axles.

The freight cars are made in covered and open design and as platform trucks. Depending on the serviceable load of 25 or 50 tons they have two or four axles. In the latter case they are fitted with cast steel Diamond bogies. All trucks have compressed air and hand brakes. They moreover correspond to all RIV prescriptions for speeds up to 100 km/h.

A special execution and interesting design is that of the 50 tons *self-discharging truck* whose convertible bottom can be used horizontally or inclined in the form of a saddle. This truck is very suitable for the transport of materials loaded in bulk such as: ores, coal, coke, sand, etc. which are easily unloaded by means of trap doors located under the level of the lateral walls. On return trips the truck can be used as a common freight truck with horizontal floor.

Among the special types of railway wagons built in the Rumanian P. R. we should cite in the first place the 50 tons tank cars used chiefly for the transport of petroleum products and which are built in great serials. From among these, very good results were obtained with the self-supported tank-car whose tank is resting directly on two Diamond bogies, without frame. For warning the soil a steam heated serpentine may be fitted inside the

(Continued on page 15)

First Commonwealth Welding Conference in June

INDIAN DELEGATES TO PRESENT PAPERS AT LONDON MEETING

OVER 100 firms, universities, and technical colleges in India, Pakistan, and Ceylon have been invited to send representatives to the first Commonwealth welding conference, to be held in England in June.

Organized by Britain's Institute of Welding, the conference will last from June 17 to 29. For the first week it will be held in London, and for the second the delegates will travel to Saltburn-by-the-Sea, Yorkshire.

The conference has three main objects: to exchange information on the present technical position of welding processes and their main applications within the Commonwealth; to consider means of improving the flow of technical information about welding; and to emphasize the importance of the increasing contribution welding can make to the development of modern engineering production.

SUBJECTS FOR DISCUSSION

Among the papers presented at the conference will be "Welding of rail joints on Indian railways", by Mr. K. C. Sood, of the Central Standards Office for Railways, India; and "Development of the use of welding in India", by Mr. G. Ghosh, Indian Oxygen & Acetylene Co. Ltd.

Other subjects covered will include welding and the industrial application of atomic energy; welding in the oil industry; the welding of bridges and structures; and the training of technicians. Papers on these and other subjects will be presented by welding engineers from Canada, Australia, South Africa, and New Zealand as well as from Britain and India.

In addition to technical sessions, the delegates will be able to visit a number of Britain's leading industrial undertakings, including the Atomic Energy Research Establishment at Harwell, Berkshire; the British Railways workshops at Eastleigh, Hampshire; shipbuilding yards; oil refineries; and the British Welding Research Association's laboratories at Abington, Cambridge.

The social programme will include an inaugural reception by the President of the Institute of Welding, Sir Charles Lillicrap; a tour of the City of London and a banquet given by the Institute of Welding.

* * *

CANADIAN LOCOMOTIVES FOR INDIA

The delivery in India of the 120th Canadian W. P. Broad Gauge locomotive under the Colombo Plan was marked by a ceremony arranged by the Railway Board at the New Delhi Station on Friday December 28, 1956.

The Hon'ble Mr. Paul Martin, Canadian Minister of National Health and Welfare, on a 10-day visit to this country made the presentation on behalf of his Government to Shri Jagjivan Ram, Union Minister for Railways and Transport, in token of the 120 locomotives given to India. Canada had also undertaken to supply to India 56 boilers and 10 tender frames under the Colombo Plan. All of these have now been received.

In his address, Shri Jagjivan Ram, Railway Minister said that there was a pressing need for increased transport facilities in the country and the delivery of these locomotives and ancillary equipment from Canada under the Colombo Plan would go a long way in helping the railways to carry more traffic. He stated that, according to present estimates the railways would be ealled upon to carry 50 per cent more of goods traffic than was handled at the end of the First Five-Year Plan. The Railway Minister concluded with an expression of thanks and appreciation of the Government of India to the Government and people of Canada for the help given under the Colombo Plan.

The Hon'ble Mr Paul Martin in his address expressed the hope of greater India-Canada co-operation in all spheres. Both nations shared much in common and by united endeavours he was sure India and Canada could materially contribute to the cause of world peace, he said.

(Continued from page 14)

tank. These wagons too are in keeping with all international prescriptions of railway traffic.

The process of manufacturing of the rolling stock is submitted to a very exacting control which is carried out in every stage of fabrication and on the finished product.

On the strength of these controls quality certificates are issued and the usual guarantees given. In addition to the usual controls made in the factory, foreign customers can empower the goods control office in Rumanian, which upon request will carry out a very strict control; more over customers may take over the material.

The export of any kind of rolling stock is handled in the Rumanian P. R. by the "Masinimport" foreign trade state company of Bucharest, Str. M. Eminescu No. 10.

Emperor Haile Selassie of Ethiopia visits Integral Coach Factory, Perambur

THE visit of the Emperor of Ethiopia to the Integral Coach Factory was memorable in that the factory was one of the very few places visited by the Emperor in Madras and that the programme was gone through as originally drawn up in spite of very unfavourable weather.

His Imperial Majesty accompanied by the Royal Party consisting of about 20 members visited the Factory on the 29th October. The Chief Administrative Officer, Shri K. Sadagopan, received the Royal Party on arrival, garlanded the Emperor and presented bouquets to the other members of the Royal family.

After introducing the principal officers of the Factory the Chief Administrative Officer gave a brief description of the factory with the aid of the layout model. The Royal Party was then taken round the Technical Training School, the Staff Colony and the Factory. At the conclusion of the visit the party was entertained to light refreshments.

Shri K. Sadagopan in a short speech thanked His Imperial Majesty for having found time to visit the factory and for the keen interest evinced by him in the progress made by the Factory. As a token of affection His Imperial Majesty was presented with a small silver model of an Integral Coach.

The Emperor in a short speech thanked the Administration for the excellent arrangements made for his visit and wished India all success in the industrial field.

As a memento of his visit to the Factory, His Imperial Majesty presented the Chief Administrative Officer with a gold coin.

MANUFACTURE OF ELECTRIC TOOLS IN INDIA

AN INDO-BRITISH VENTURE

Greatly increased industrial output, if it is not to sacrifice quality in the process of acceleration, calls for an abundant supply of performance-proved tools, Regular availability of better and more dependable tools is a very important factor in our rapidly expanding economy with special emphasis on industrialisation.

The Indian industry would therefore welcome the news that an Indo-British venture has launched a scheme for the manufacture of electric tools in India, and that the production has already commenced. The collaberators on this project are the WOLF ELECTRIC TOOLS LTD., London and RALLIS INDIA LTD., Bombay.

This Indo-British venture, the first of its kind in India will go a long way in ensuring adequate supplies of electric tools. And the close collaboration of the participating firms, both of which are well established, and the freqnent exchange of technical experts will ensure that the Indian-made Wolf tools would be of the same high quality as those made in England.

An interesting feature of this venture is that a substantial portion of indigeneous materials is being used in the manufacture of Wolf electric tools in India.

* * *

RAILWAY EQUIPMENT COMMITTEE REPORT

Printed copies of the report submitted by the Railway Equipment Committee, which was set up last year *inter alia* to suggest ways and means for developing the indigenous manufacture of imported items of railway equipment, are now available for sale to the public through the Controllers of Stores of the Central, Eastern, Northern and Southern Railways at Bombay, Calcutta, Delhi and Madras respectively.

IN YOUR OWN INTERESTS

HOW TO PURCHASE TICKETS

Buy your tickets only at the proper place. The authorised offices are (i) the Booking offices at the railway stations, (ii) the Town or City Booking Offices, (iii) the out-Agencies, (iv) Travel Agents. Never buy tickets from any other source as that may lead you to trouble. Please note that tickets are not transferable.

Buy your tickets in the proper time. You can avoid unnecessary excitement and trouble if you come to the station in good time, that is at least half an hour before the scheduled departure of your train. The Time Tables of the Railway are on sale at Booking Offices and Bookstalls.

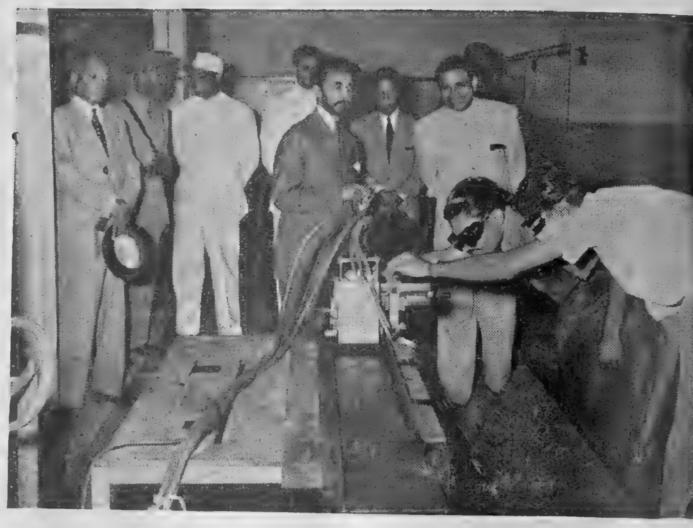
Buy your tickets in the proper manner. Queue up at the Booking Window and you can get your ticket easier and quicker than by crowding at the counter.

By handing in the *exact fare in good coins or currency* you get the ticket easier and quicker, and save for yourself and the Booking Clerk time and trouble.

Check up your ticket and money before leaving the counter and draw the attention of the Booking Clerk to any discrepancy you may notice.

(Inserted in the interests of Travelling Public)

His Imperial Majesty Emperor Haile Selassie of Ethiopia motoring in the workshops of the Integral Coach Factory, Perambur, Madras. With His Majesty in the car are seen Shri K. Sadagopan, Chief Administrative Officer and Shri K. Kamaraj, Chief Minister of Madras.



His Imperial Majesty Emperor Haile Selassie of Ethiopia at the Technical Training School attached to the Integral Coach Factory, Perambur Madras.

The Royal Party departed after the Ethiopian and the Indian National Anthems were played by the Southern Railway Protection Force Band.

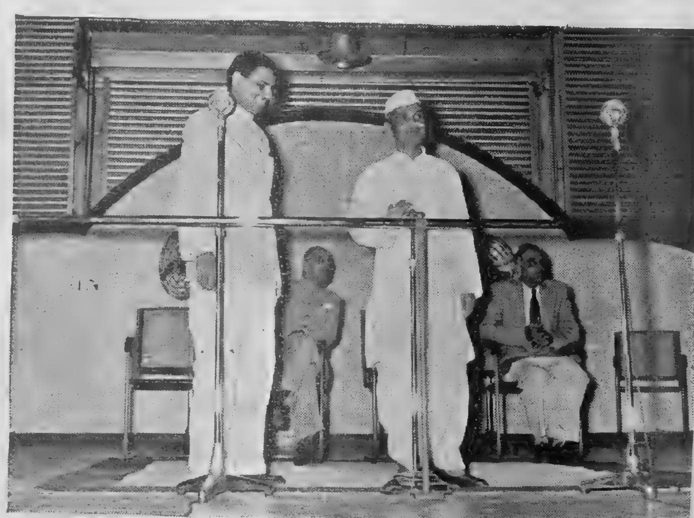
* * *

RAILWAY MINISTER INAUGURATES THIRD ASSEMBLY LINE IN INTEGRAL COACH FACTORY, PERAMBUR

Shri Lal Bahadur Shastri, Minister for Transport and Railways, inaugurated the Third Assembly Line at the Integral Coach Factory, Perambur on 23—10—56 at a function held in the Main Assembly Shop of the factory. The function was attended by the Principal Officers of the Southern Railway and by all Officers, Swiss Personnel and staff of the factory.

The Main Assembly Shop has 6 assembly lines and the inauguration of the third assembly line marks another step towards the increase of production in the Coach Factory. The output during the second year of production will be 120 as against 43 during the first year.

Shri K. Sadagopan, the Chief Administrative Officer, welcomed the Railway Minister and reviewing the work done during the first year of production, stated that the original target of 20 coaches a year was increased to 40 and that the actual number completed was even greater than that, being 43. He assured the Railway Minister that the full production target of 350 coaches

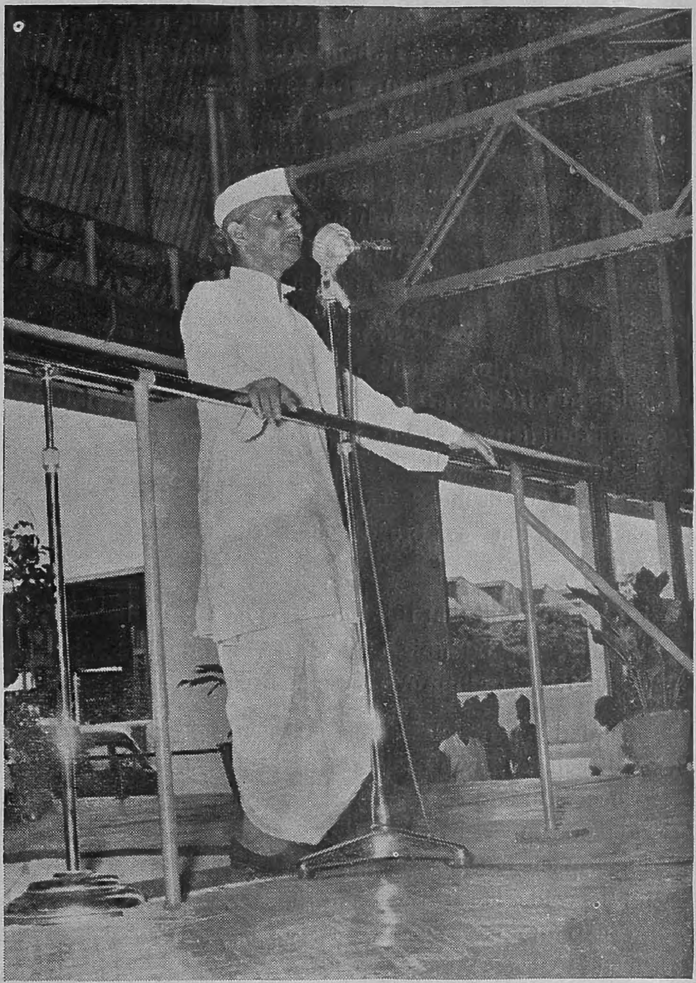


Shri Lal Bahadur Shastri pressing a button for the first coach assembled on the 3rd Assembly line to move out. Seated behind are Shri Bhattacharya, Financial Commissioner of Railways and Shri T. A. Joseph, General Manager, Southern Railway.

a year would be reached within 4 years instead of 5 years as originally planned.

Whilst reviewing the progress made towards manufacture of components from indigenous material, he said:

"You may be pleased to hear that we have made considerable progress in the indigenous manufacture of details and sub-assemblies of the coaches to be produced in the Factory. Five batch orders have already



The Union Railway Minister Shri Lal Bahadur Shastri addressed the workers of the Integral Coach Factory, Perambur, Madras at a meeting in the Main Assembly Shop of the Factory for the inauguration of the 3rd Assembly line in the factory.

been issued on the Works, the first for 10 coaches, the second, third and fourth for 2 coaches and the fifth for 30 coaches. We have been able to successfully manufacture all the details and sub-assemblies in the Factory, and the first " all-Integral Coach Factory ", manufactured coach shell was moved out of the assembly line on the 14th of August this year, much ahead of schedule, on the occasion when our revered Rashtrapati, Shri Rajendra Prasad honoured us with a visit ".

He also stated that all that had been achieved so far had been only due to the enthusiasm, efficiency and patriotic devotion to duty of the workers of the factory and also due to the co-operation given by the Swiss engineers and experts.

With regard to raw material procurement he said :

" We are actively pursuing a policy to develop capacity for the manufacture of all the materials required by us in the country. We have approached the Iron and Steel Ministry for planning the production of steel required by us in the new Steel Plants that are coming into existence. In regard to the other imported items, we have been able to cut down our imported items from 133 in the first lot too only 33 in the fourth lot. This reduction has been possible by maintaining a constant drive to develop indigenous manufacturing capacity, and the following action has been and is being continued to be taken in this connection.

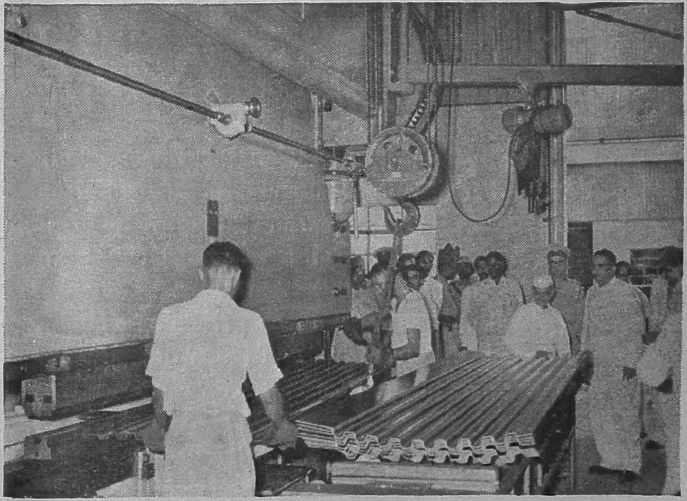
(1) Educational orders (trial orders) are being placed on the Manufacturers in the country to ascertain their capacity for the manufacture of imported items.

(2) Samples of imported items have been displayed in the Railway Equipment Show Room.

(3) Advertisements have been inserted in all the leading Newspapers in the country inviting firms and industries to quote for the manufacture of the imported items.

(4) Imported samples of materials are being sent to Manufacturers who are interested in the production of such items.

We have been successful in locating indigenous capacity for aluminium extrusions, light alloy castings, rubber profiles, small springs and other miscellaneous items. Wheels and axles, steel castings, helical and laminated springs, roller bearings for the axles and other miscellaneous items are continued to be imported "



The Railway Minister Shri Lal Bahadur Shastri in the workshops of the Integral Coach Factory, Perambur, Madras

With regard to ordering of machinery Shri Sadagopan observed:

" As a measure of financial prudence, our procurement of plant and machinery was for a production capacity of 250 coaches in a year. It was the intention then that, with a view to obviate the possibility of excessive investment on plant and machinery, we should order machinery sufficient for 250 coaches only in the first instance, pending actual experience and determination of the plant and machinery required for the attainment of the full production target of 350 coaches a year on a single shift. We have now gained sufficient experience of the work loads and the capacity of the machines already installed and we have already taken action for the procurement of a second lot of plant and machinery totalling about Rs. 60 lakhs. These machine tools are expected to be delivered in the course of this year and the next year ".

In connection with the furnishing of coaches Shri Sadagopan said:

" The Railway Ministry have accepted in principle that the Integral Coach Factory should make necessary arrangements for the furnishing of coaches turned out by the Integral Coach Factory by establishing a Furnishing Annexe in close proximity to the Integral Coach Factory instead of depending on the Railway Systems to furnish the coaches in their Workshops. A Special Officer has been investigating the possibility of the establishment of such a Furnishing Factory, and a Project Report has now been submitted to the Railway Board in this connection. The plan is to have a separate Factory close to the Integral Coach Factory and, in order to cover the gap between now and the establishment of a permanent Factory, it is proposed to organise interim furnishing arrangements with temporary structures. It has also been decided that the Integral Coach Factory should immediately take up the furnishing of a limited number of coaches in the free space available in the existing shops. The work of furnishing the first coach has already been taken in hand. The commencement of the furnishing work immediately in the Integral Coach Factory on a temporary basis will enable the building up of the technical personnel required in stages so that, by the time when the permanent Furnishing Factory takes shape, it may be possible to switch over the entire technical personnel to the permanent Factory and take in hand the furnishing of the entire output of 350 coaches by the Integral Coach Factory without any time-lag ".

In conclusion he stated:

" I beg to acknowledge the assistance and co-operation we have always received from the Southern Railway. It is heartening to us to note that the Southern Railway have been able to take in hand the furnishing of the shells we have sent to them, and you have just inspected the first coach completed by the Southern Railway, if I may say so, within a record time. This, if I may respectfully say so, is a creditable achievement, as, although we have been supplying shells to Railways since October last, the credit for putting the Integral Coach Factory Coach on the line, in as short a time as possible, goes to the Southern Railway ".

Shri Lal Bahadur Shastri in his speech said that he was pleased with the progress made during the past one year and that he was keenly looking forward to the day when the factory will be reaching the full production capacity of 350 coaches a year, making the country self-sufficient so far as broad-gauge coaching stock is concerned.

Shri Shastri said that third class travel should be made as attractive as possible and that continuous efforts should be taken to improve the amenities provided.

He added that the sleeping berths provided for third class passengers, as a trial measure, had proved to be very successful and that arrangements had been made to provide 60 upper berths in third class carriages with a seating capacity for 80, so that sleeping accommodation would be available for 60 out of the 80 passengers. He stated that a nominal fee of Rs. 3 per night would be levied and that sleeping accommodation would be available only for 60, as some of the passengers might not wish to avail of the amenity and some might be only short distance travellers.

Shri Shastri then referred to the ambitious plan of the railways launched during the Second Five-Year Plan and drew the attention of the railway workers to their responsibility in seeing that the plans were fulfilled. He also remarked that by the end of the second plan period the country would be self-sufficient so far as coaching stock went.

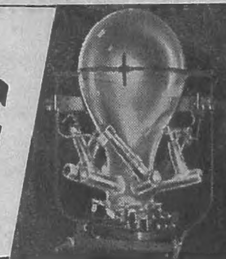
The Railway Minister expressed his appreciation of the interest taken and the co-operation extended by the Swiss Personnel of the Factory.

In conclusion Shri Shastri said that the cleanliness of the workshop and the way in which the colony had been developed made a deep impression on him and that this Factory had become one of the show pieces of the Indian Railways.

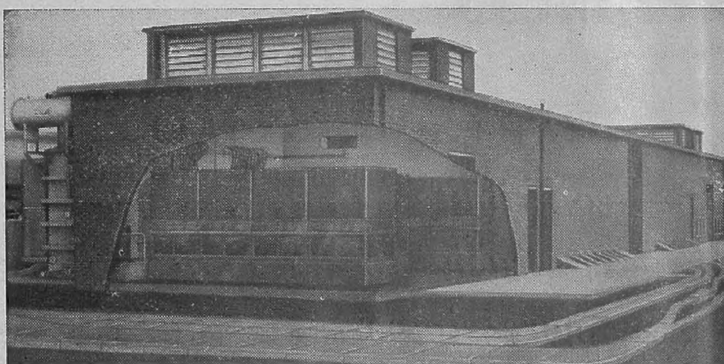
He then pressed the button and formally inaugurated the Third Assembly Line, when a completed coach shell rolled out of that line amidst Nadaswaram music and a shower of rose petals from an overhead crane.

IN TRACTION SERVICE IN **18** COUNTRIES ...

Hewittic RECTIFIERS



the converting plant used by the World's principal railways

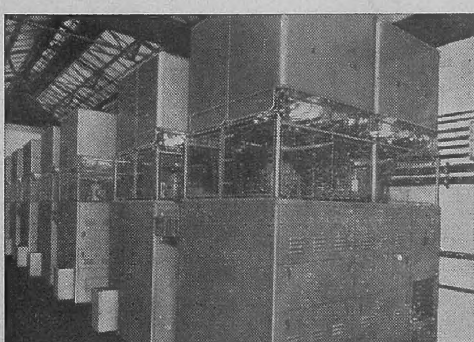


BRITISH RAILWAYS SOUTHERN REGION

One of 28 substations being equipped with Hewittic Rectifiers by the British Transport Commission for the Southern Region of British Railways. The photograph shows Wimbledon substation with one wall cut away to show the two 2,500 kW rectifiers in this half of the building.

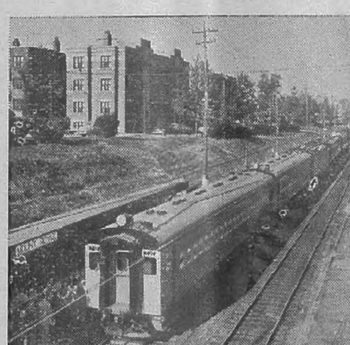
BRITISH RAILWAYS LONDON MIDLAND REGION

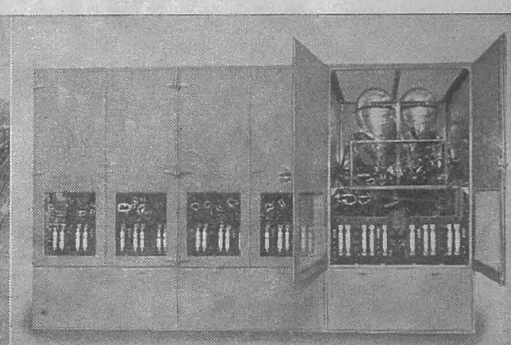
A train passing one of the 14 Hewittic Rectifier substations on the Liverpool-Southport line. These have an aggregate capacity of 24,260 kW and supply 93 miles of electrified track. Hewittic Rectifiers installed on other sections of this region total 47,300 kW



LONDON TRANSPORT RAILWAYS

The 4,000 kW Bond Street substation, equipped exclusively with Hewittic Rectifiers. The plant comprises four 1,000 kW combined rectifier and enclosed air-cooled transformer units. This company is also responsible for the supply and installation of all A.C. and D.C. control gear. Some 90,000 kW of Hewittic Rectifiers have been supplied to the London Transport Executive.





CANADIAN NATIONAL RAILWAYS

The electrified section of the Canadian National Railways, comprising some 70 track miles in the vicinity of Montreal Terminal, is supplied with D.C. by Hewittic Rectifiers in two 3,000 kW substations at Central Station and Saraguay. The photographs show left, a train leaving Mount Royal Station, and right, one of the four 1,500 kW equipments in service. These are designed for operation at 3,000 volts, D.C.

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CLEANLINESS LEADS TO HEALTH AND HAPPINESS

Clean orderly habits contribute to general health and welfare and as such to happiness and prosperity; they are more important than medicines.

Cleanliness prevents disease; medicine only attempts to cure.

Cleanliness of the person, of the houses and colonies, reflects discipline in the individual and the community. Discipline is the foundation stone for p[illegible] oneself and the country. Cleanliness i[illegible] habit. It is also cheap.

All Railwaymen should set an example of cleanliness. This will help others and themselves.

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